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First Record of *Lecithochirium* sp.(Digenea : Hemiuridae) in the Marine Fish *Carangoides bajad* from the Red Sea, Coast of Yemen

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Abstract. The present study is the first investigation of digenetic trematode parasites in *C. bajad*, a commercially important teleost fish species of the Red Sea, Coast of Yemen from AL-Khatheib region, in the coast city of Hodeidah, during the period from January to December 2006.

A total of 112 *C.bajad* (Local name: Bayad) were examined, 16 specimens were found harboring *Lecithochirium sp.* (Lecithochirium: Hemiuridae). The prevalence and mean intensity of infection were 14.3 % and 2.9 respectively. And the number of parasite per fish range 1-6. Prevalence and intensity of infection was positively correlated with host size (increasing with host size increasing). Host sex does not seem to affect prevalence of infection. The present work represents the first record for the presence of this parasite in *C. bajad* fish in Yemen's coastal Red Sea water.

Introduction

Carangoides bajad Forsskal, 1775 (Carangoidae) is a demersal carangid fish, widely distributed in the Red Sea. It is an important commercial fish in Yemen and other countries along the Red Sea. It is a carnivorous fish feeding on crustacean and planktonic invertebrates. Parasites play a very important part in the lives of their hosts (Dogiel, 1964). Fishes are an important source of animal protein for human consumption and the impact of parasites on their populations is well documented (Williams

and Jones, 1994). In addition, the potential risk of transmission of Zoonotic diseases through the consumption of parasitized fish, could cause public health problems (Sakanari, 1990; and Williams and Jones, 1994). Digenean trematodes primarily infect gastro-intestinal tract in marine fish, and their life cycle involves two to four hosts (Barnes, 1980). Parasitic fauna of *C. bajad,* and other fish from Yemen are poorly known. Until recently, there were no data on the helminth parasites of this fish species.

During January to December 2006, an investigation was carried out to document digenean parasites of fishes in the Red Sea coastal waters at Hodeidah, Yemen. A total of 112 specimens of *C. bajad* fish were examined, and in addition, some other parasitic nematodes were also recorded from this fish. This paper documents for the first time the prevalence and intensity of the digenean parasite *Lecithochirium* sp. in *C. bajad* fish in the Yemen's Red Sea coastal waters of Yemen

Materials and Methods

Digenetic trematodes were isolated from the teleost fish species *Carangoides bajad.* A total of 112 specimens (male, 64 and female, 48) were collected from the Red Sea coast at Hodeidah (Al-Khatheib region), during the period from January to December 2006. Fish were caught by gill nets, trawl nets, traps, and hook and transported fresh to the laboratory of Marine Biology and Fisheries Department, Hodeidah University. The total length of specimens varied from 15-95 cm. Fish were divided into four classes depending on their length. After opening their abdomen, flukes were washed out and collected from the stomach. Flukes were fixed in 5% formalin, flattened with minimal cover slip pressure, and stained with aceto-carmine stain. The specimens were then dehydrated in an alcohol gradient series. Identification of the digenea was carried out based on a scheme provided by Yamaguti (1971) and Surekha and Lakshmi (2005). Measurements are given in millimeters unless otherwise indicated . Drawing were made with the aid of camera Lucida. Prevalence (P), mean intensity (M), and its range (R) were determined following Morgolis *et al.* (1982), and Bush *et al.* (1997).

Results and Discussion

From the total fish examined in this survey, 16 (14.3%) were found to be infected with *Lecithochirium sp.* (Fig. 1).

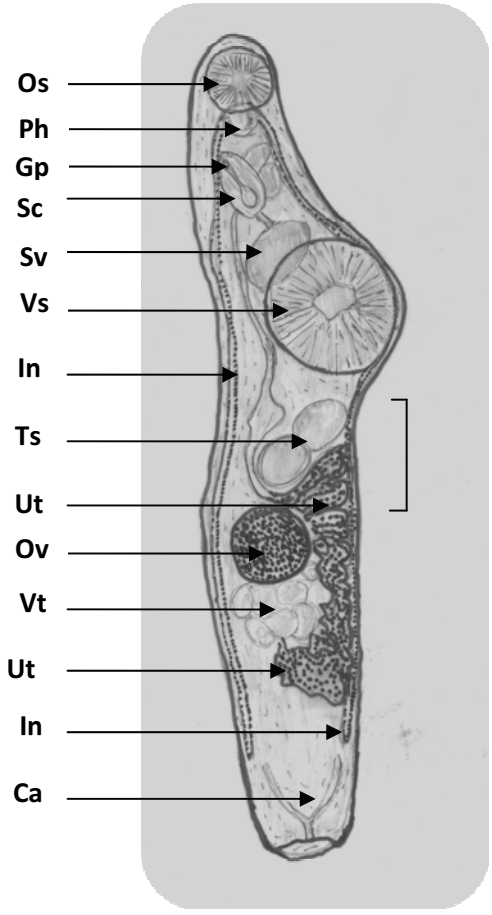

Fig.1. *Lecithochirium sp.* from marine fish *Carangoides bajad*. scale bar=0.3mm.

Abbreviations

Os: Oral sucker	**Ph: Pharynx**	**Gp: Genital pore**	**Sc: Sinus sac**
Sv: Seminal vesicle	**Vs: Ventral sucker**	**In: Intestine**	**Ts: Testis**
Ut: Uterus	**Ov: Ovary**	**Vt: Vitellaria**	**Ca: Caudal appendage**

Classification

Phylum: platyhelminthes
Class: Trematoda Rudolphi, 1808
Subclass: Digenea VanBeneden, 1858
Order: Azygiida Schell, 1982
Suborder: Hemiurata
Family: Hemiuridae Luhe, 1901
Subfamily: Hemiuroidea Faust, 1929
Genus: Lecithochirium Luhe, 1901

Description

Elongated fluke with bulging around the ventral sucker.

Body length: 1.1-2.8mm (2.10 mm), and 0.35-0.51 mm (0.44 mm) in width.

Oral sucker: sub terminal, 0.10-0.19 mm (0.13 mm) in diameter.

Pharynx: sub spherical, well developed, immediately behind about 3/5 as large as the oral sucker.

Esophagus: very short.

Ventral sucker: prominent, 0.30-0.42 mm (0.35 mm) in diameter, and located in the anterior one-third of the body, about 0.31-0.75 mm from the oral sucker, ratio of length of oral sucker to length of ventral sucker 1:2.9.

Ovary: globular, post testicular in right body.

Uterus: coiled.

Vetellaria: oval in shape and adjacent to the ovary.

Genital pore: behind the oral sucker, between the intestine armi.

Intestine: extend to the posterior end of body.

Testes: one pair, spherical to oval in shape.

Sinus sac: pyriform.

Taxonomic Summary

Type host: *Carangoides bajad,* Forsskal, 1775

Total body length: 15-95 cm.

Site of infection: stomach.

Type locality: Red sea, Coastal Zone of Hodeidah City, Yemen Republic.

Overall prevalence: 14.3% (16 infected fish / 112 fish examined).

Prevalence in each host length (age) classes:

A- 15-30 cm, N= 30, P = 6.7%.

B- 31-45 cm, N = 47, P = 10.6%.
C- 46-55 cm, N = 24, P = 25.0%.
D- >56 cm, N = 11, P = 27.3%.
Overall mean intensity: 2.9 (47 parasites / 16 infected fish).
Mean intensity and its range in each host length classes:
A- 15-30 cm, N = 30, M = 1.5, R = 1-2.
B- 31-45 cm, N = 47, M = 2.4, R = 1-4.
C- 46-55 cm, N = 24, M = 3.0, R = 2-4.
D- > 56 cm, N = 11, M = 4.7, R = 3-6.
Prevalence with sex of fish host:
A- Male, N = 64, infected = 9, P =14.1%.
B- Female, N = 48, infected = 7, P = 14.6%.

It is well known that marine fish may play roles of intermediate or definitive hosts for a number of helminthic parasites. The feeding habitats and wide diet spectrum of marine fishes bring them in contact with marine parasites. The digenean family Hemiuridae is the most common digeneans found inside the digestive tract of marine fish, and the present isolate, *Lecithochirium* is the most common genus of this family (Shih *et al.,* 2004).

The type species of Lecithochirium Luhe,1901 is *L. rufoviride* (Rud., 1819) Luhe, 1901. It is characterized by one pair of hump-like thickenings projecting into the lumen of the oral sucker, by a well defined preacetabular pit, an “ejaculatory vesicle” rather than a “prostatic vesicle” in the sinus sac, short vitelline lobes and sub equal suckers. The hump-like elevations in the oral cavity do not occur in most species described in Lecithochirium. Actually, the wall of the sinus sac of some species of Lecithochirium is more or less open posteriorly and seems partially to enclose one end of the prostatic vesicle (Manter, 1954).

Obviously, the genus Lecithochirium is in a very unsatisfactory state. There are so many variations and combinations of characteristics that make selection of distinguishing characteristics difficult and thus mostly arbitrary (Manter, 1934). One or more of the following three characteristics seem most appropriate: The presence or absence of a preacetabular pit ; presence or absence of elevations in the wall of the oral cavity; and the characters of the male vesicle within the sinus sac (Manter, 1954). According to Yamaguti (1971) the outstanding

diagnostic generic features of Lecithochirium are male gonads, fish host and harboring site in host, the species are parasitic in stomach of marine fishes with the testes being symmetrical, and immediately posterior to the acetabulum. Surekha and Lakshmi (2005) stated that the genus Lecithochirium have exclusive taxonomic characters like a well or poorly developed ecsoma and a presomatic pit or ventrocervical groove, seminal vesicle bipartite or tripartite and occasionally coiled, vitellarium condenced and usually divided in to 6-7 oval to digitiform lobes and with massive uterine coils. The characteristics of all specimens collected during this study, such as: body form (elongated), testes(one pair), Vetellaria (7oval in shape), Uterus(coiled), and site of infection (stomach) in a marine fish host place this species within the genus *Lecithochirium*. The species described under the present study showed some similarity to *L. tetraorchis* (Shih *et al.,* 2004), but may be distinguished from it by average total length (2.8 mm for the *Lecithochirium* species of this study *Vs* 1.959 mm for *L. tetraorchis*), by the number of testes (one pair *Vs* two pairs), by the genital pore (behind the oral sucker *Vs* near the anterior margin of oral sucker), and by the vitelline lobes which are much longer and thinner in the current *Lecithochirium sp*. The genus *Lecithochirium* also contains other species parasitic in marine fish such as: *L. gravidum* looss, 1907; *L. physcon* luhe, 1901; *L. musculus* (looss, 1907); *L. synodi* Manter, 1931; *L. furcolabiatum*, (Luhe, 1901), *L. conviva* Luhe, 1901; *L. australis* Manter, 1954; *L. magnaporum* Manter, 1940; *L .genypteri* Manter, 1954; *L. flexum* Manter, 1954 and *L. trichiuri* (Guet shen, 1981). Features of *Lecithochirium* species of this study do not conform to features of the above-mentioned *Lecithochirium* fish parasites. The Lecithochirium genus now contains at least more than 100 species (Surekha and Lakshmi, 2005). Some of which are doubtful members of the genus (Manter, 1954). These worms are generally morphologically complex, the ecological, physiological, and environmental factors of the hosts and the adaptations of parasites might have lead to morphological variations of flukes (Surekha and Lakshmi, 2005).

In this study the prevalence and intensity of *Lecithochirium* sp. was low, 14.3% and 2.9 respectively. Hoberg (1996) mentioned that the feeding habit, geographic distribution of first and second intermediate host and the mobility of certain developmental stages (such as cercaria) have been postulated to limit the interaction between the digeneans and

their host. Moreover, the structure of parasites communities correlate with: host mobility, mode of reproduction of the parasite, complexity of the parasite life cycle, host specificity, and a biotic factors (Huyse *et al*., 2005).

The prevalence and mean intensity herein showed positive correlation with host length. This may be due to the diet of larger fish being more diverse than smaller size ones. Diverse diet may increase the probability of encountering parasites. Infection by helminthes in marine fish is strongly influenced by the diet of fish and the regional distribution (George-Nascimento, 1987). According to Al-Zubaidy (2007), correlation between the host length and parasite prevalence is a pattern widely recorded in marine fish from the Red Sea coast at Hodeidah, Yemen and is also documented with numerous cases in freshwater and marine fish from other different geographical regions (Luque *et al*., 1996; Alves and Luque, 2001). The relation among the length and prevalence of several parasite species, possibly originated by accumulative infections (Luque and Chaves, 1999). It is apparent that large size fish can at least space-wise harbor more parasites. Alves and Luque (2001) mentioned that the digenean Lecithochirium was exception, with the highest values of prevalence in the intermediate length class, when the fish inhabit the littoral zone at 25-30 meters deep. Transmission and prevalence of digeneans in pelagic zone are restricted, because the most frequently used intermediate hosts generally occur in the littoral zone (Bustnes and Galaktionov, 1999). As a rule, in all host species that have been accurately studied for parasites, infection changes with age (Rohde, 1984).

According to Kennedy (1975) the differences in parasite infection between sexes can be expected and are explained as a consequence of difference in physiological status, in ecological niches, and in the diet. In this study parasite prevalence is not related to sex. This may be attributed to no differences in habitat and feeding habits of male and female *C. bajad*. AL-Zubaidy (2006) was unable to find differences in diet of male and female of *C.bajad*. Of all the above-mentioned factors, diet of the host species is the main factor affecting the parasite transmission. This has been reported to be the case in digenean trematodes transmitted to their final host through a predator-prey relationship (Sasal, *et al.,* 1999).

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التسجيل الأول لنوع من جنس ليسيثوشيريم (*Lecithochirium*) من عائلة هيميوريدي (Hemiuridae) طائفة مزدوجة التولد (Digenea) في أسماك البياض من نوع *Carangoides bajad* من البحر الأحمر، الساحل اليمني

علي بناوي الزبيدي

قسم الأحياء البحرية والمصائد– كلية علوم البحار والبيئة

جامعة الحديدة – اليمن

المستخلص. الدراسة الحالية هي الأولى التي تجري على طفيليات الدايجينيا (Digenea) وهى من المثقبات المعوية (Trematoda), في أحد أهم أنواع الأسماك العظمية الاستهلاكية، والتي جمعت من منطقة الكثيب, ساحل البحر الأحمر في مدينة الحديدة – اليمن, خلال الفترة من يناير إلى ديسمبر ٢٠٠٦م.

من مجموع ١١٢ سمكة كانت ١٦ مضيفا لجنس ليسيثوشيريم العائد إلى عائلة هيميريديم من ديدان المثقبات المعوية. وكانت نسبة ظهور ومعدل الإصابة ١٤,٣٪ و ٢,٩٪ على التوالي. وتراوح عدد الطفيلي في السمكة ما بين ١–٦. وكانت نسبة ظهور ومعدل الإصابة بالطفيلي موجبة الارتباط مع حجم المضيف. ولم يلاحظ تأثير لجنس المضيف على نسبة وشدة الإصابة.